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Citation: Dalton, Ruth (2007) Social exclusion and transportation in Peachtree City, Georgia. Progress in Planning, 67 (3). 264 - 286. ISSN 0305-9006

Published by: Elsevier

URL: <http://dx.doi.org/10.1016/j.progress.2007.03.001>
<<http://dx.doi.org/10.1016/j.progress.2007.03.001>>

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4 Social Exclusion and Transportation in Peachtree City, Georgia

Ruth Conroy Dalton

Abstract

This paper will discuss how, in a small American city, Peachtree City (43km south of Atlanta), the flexibility and relative affordability of electric golf carts, as a viable alternative to the automobile, means that the level at which families and individuals are disadvantaged through their lack of access to public/private transport is effectively lowered. Economic access to golf carts, in of itself, would not be sufficient if it were not for the extensive, highly penetrative and 'ringy' spatial structure of the cart path system, a mostly-segregated, 150 kilometre network. A spatial analysis of this dual transportation system is presented and its implications discussed. The conclusion of this paper is that the duality of the effective spatial structure of the cart path network and the relative low cost and inherent flexibility of the golf carts combine to reduce transportation-linked social exclusion in Peachtree City. This argument is substantiated, in the final section of the paper, through the evidence of a questionnaire distributed to a random sampling of 1,038 property owners and renters in the city.

Keywords: social exclusion, transportation equality, transit equity, space syntax, axial analysis, secondary transportation system, leisure trail, planned community

Introduction: social exclusion and transportation in the UK and the USA from a UK perspective

The relationship between social exclusion and transport

Social exclusion is defined by the UK government as being "a shorthand term for what can happen when people or areas suffer from a combination of linked problems such as unemployment, poor skills, low incomes, poor housing, high crime, bad health and family breakdown". The fundamental idea underpinning all research into the links between social exclusion and transportation is that some groups of society, the young, elderly, less physically able, ethnic minorities and lower income groups (and often these groups are not clearly distinct but frequently overlap) become increasingly excluded from mainstream society through accessibility barriers to everyday, vital services, such as locations of employment, healthcare and shops (Social Exclusion Unit, 2003). This has come about through significant rises in car-ownership and the related trend towards more centralised services, such as out-of-town shopping centres, and the emergence of sparser urban (suburban and exurban) spatial patterns. As a consequence the difficulties faced by those without cars have increased proportionally. "Those without cars usually need more time, greater effort, and pay a higher marginal cost to reach the same destinations as people with cars." (UK Department of Transport) These trends are mirrored in both the UK and the USA. Other historical reasons for the rise of the inaccessibility of essential services in the UK include the deregulation of bus services in 1985, the rise of bus fares in real terms, growing congestion leading to the greater unreliability of bus services and a drop in local authority spending on public transport (ibid).

The motivation of research in social exclusion and transport

The causal relationship between factors of social exclusion and transport is becoming an increasingly important issue in the UK and the USA. However, the approach that both countries take is slightly different. This difference is initially highlighted by the words and descriptive phrases used. In the UK, we refer to 'transport and social exclusion', the emphasis being upon the effects of exclusion or segregation on specific sectors of society, this is in contrast to the USA where the same issues are discussed under the umbrella-title of 'transport' or 'transit equity'¹, with the emphasis being upon the core American value of equality. Along with the right to free speech, the issue of equality is central to the American national identity. Perhaps as a result of this, research and policy in the USA seems to be skewed towards how to achieve this idealised goal, for example, Grengs asks, "Should public transit serve an even higher purpose, as an instrument for advancing social justice?" (Grengs, 2005: 52). Although he later suggests that the idealism of social equity through transport is now beginning to fade, "This shift away from meeting social goals toward the more narrow purpose of relieving traffic congestion, from achieving equity toward merely efficiency, is now influenced by a neoliberal political agenda that separates the social from the economic, causing planners to lose sight of the public purpose of mass transit."

In contrast to this, the UK approach to transport and social exclusion seems to take a more pragmatic approach. In a recent report (Social Exclusion Unit, 2003) to the Office of the Deputy Prime Minister, the Social Exclusion Unit outlines five measures that contribute to social exclusion and hence should be tackled as part of any policy, these being: the existence of a transportation infrastructure (is it actually possible to get from A to B?), the availability of information needed to understand transportation choices (do the public know how to get from A to B?), the financial cost of travel (is the journey from A to B affordable?), the creation of safe travelling environments (does an individual feel safe making the journey from A to B?) and the intelligent siting of vital services within communities (is the journey from A to B even necessary if services can be provided locally?). This practical approach, which lends itself towards policy formation and tangible solutions, appears, however, to be motivated by less lofty ideals than its counterpart in the USA. If the types of destinations that should be rendered accessible are brought into question, high on the list are places of work and learning (ibid), the other destinations being healthcare, food shopping and social activities. It does appear that, in the UK, a significant impetus to solving the problems of social exclusion and transport is strongly motivated by getting people to work and so, presumably, reducing their dependency on the state. This is not to say that such considerations are not part of US policy, for example through their 'welfare-to-work' programs (U.S. Department of Transportation, 1998), it is simply that the importance placed upon the goals and motivations driving the policies in both countries appears to differ slightly: the core elements are the same, it is the relative ranking of importance that shifts.

¹ In the USA, *transport/transit equity* (sometimes referred to as *transit racism*), is defined simply as "unjust, unfair, and unequal transportation policies and practices" (Bullard Johnson and Torres, 2000). Equally, in the USA, the phrase *transit* as opposed to *transport* frequently refers to the provision of public-transport as opposed to *transport*, which also includes modes of private transport such as cars, cycling and walking.

Finally, another key difference between the USA and UK is suggested by Sanchez and Wolf (Sanchez and Wolf, 2005) who propose that, “In the United Kingdom, policymakers and advocates often take a broader view of social inequity. The British effort to combat ‘social exclusion’ is a more wide-ranging approach than the U.S. focus on employment and housing mismatches. Efforts to eradicate social exclusion address communities that are isolated from or marginalized by general society.” Their argument states that in the USA the definition of transportation equity appears to have a far narrower focus, essentially concerning itself solely with issues of race and class, whereas in the UK, the concern about links between transport and social exclusion covers other potentially disadvantaged groups such as the young, elderly and less physically able.

The scope of research into social exclusion and transport

The focus of research (in both the UK and USA) into social exclusion and transport focuses almost exclusively on issues of *public* transportation. One of the problems with public transport solutions is that they frequently become stigmatised as being associated with low-income users. Where issues of transportation touch upon possible solutions to provide access to affordable modes of *private* transportation for groups hitherto excluded from, for example, private car ownership, there has been far less written and far fewer solutions implemented.

In the UK, some examples of ‘quasi-private’ transportation solutions include an increasing number of ‘pay-as-you-drive’ car clubs and lift-sharing initiatives. In addition to this, are demand-responsive, door-to-door services such as the shared taxi service in South Shields detailed in the Good Practice Guide published by the Passenger Transport Executive Group (UK) (Passenger Transport Executive Group, 2006).

If *private* rather than *quasi-private* solutions are considered, under the banner of ‘subsidised personal transport’, initiatives such as the provision of repair grants for otherwise un-roadworthy cars, subsidised driving lessons and the subsidised lease of cars, mopeds and bicycles (Social Exclusion Unit, 2003) can be found. One clear example of this is the ‘Wheels to Work’ project in Warwickshire, which offers the loan of a moped for up to twelve months to young people starting work/further education (ibid). As Roche commented in her speech to the Community Transport Association, “The mopeds have helped get young people get to both jobs and places of training and education. It’s opened dramatic new horizons for many of them.” (Roche, 2003).

In contrast to these British initiatives, this paper looks to the USA for one example of a sustainable, affordable *private* transportation solution that appears to be successfully, if perhaps unintentionally, aiding hitherto disadvantaged social groups. In terms of the five areas of accessibility, outlined by the Social Exclusion Unit, and described above, the cart-path network in Peachtree City serves to fulfil two of the five criteria: it is improving physical accessibility (through the provision of the network) and is making travel more affordable (through the relative cost of the golf carts). In terms of the social groups benefiting from the network, they include the older, younger, those with physical mobility problems as well as the economically disadvantaged.

The aim of this paper is to further understand the relationship between the spatial structure of the city, the success of the Peachtree City's cart part network and the extent to which this benefits its citizens, with particular focus on those sectors of society frequently disadvantaged by 'car culture'. In this respect, this paper echoes the viewpoint of the first paper in this issue by considering the physical city and the social city to be a duality that must be examined together. The second aim of the paper is to question what lessons can be learnt from Peachtree City and to what extent some of these findings may be reproducible elsewhere.

Peachtree City, Georgia

Peachtree City² is a commuter satellite-city (or perhaps what Soja refers to as an *exopolis*, the city without (Soja, 1992: 95)) to the South East of Atlanta, Georgia, USA. It is accessed via Interstate 85³, a major travel corridor through the Deep South connecting Petersburg, Virginia in the North with Montgomery, Alabama to the South and passing through key Southern cities such as Charlotte and Atlanta en route. See Figure 1, for a location map of Peachtree City. The city is accessed directly from Highways 74 and 54 which intersect approximately 1km to the west of Lake Peachtree, an artificial lake created by damming Flat Creek (Satterthwaite, 2005) and which now forms the heart of the city. See Figure 2 for an aerial photograph and city plan indicating the highways, the two main lakes (Lake Kedron to the north and Lake Peachtree to the south) and the city boundaries.

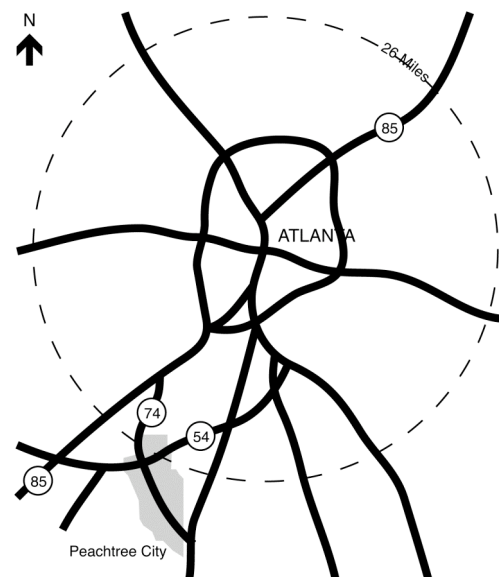


Figure 1. Location of Peachtree City

The city was a planned community built entirely by private developers; it was chartered on March 9, 1959. Its area covers approximately 15,637 acres with a current population of 37,868 (2005 census, an increase of 19.91% since 2000). Estimates for 2010 indicate a population of 44,156 but, for planning purposes, the city is working to

² Community website <http://www.peachtreecityweb.com/>

³ Guide to Interstate 85 can be found at <http://www.interstate-guide.com/i-085.html>

a build-out target population of 38,500 residents (CPCPD, 2006a). The population density is currently 598.4 people/km² (1,550.3 people per square mile or 2.4 people per acre) (ibid) and was originally hailed as being “Surburban living at its best”, whilst offering “All the advantages of a ‘small town’, informal and charming.” (Peachtree City Corporation of Georgia, 1957).

One key aspect of Peachtree City’s history was the passing of legislation in 1974 permitting the use of electric golf carts on city streets (Satterthwaite, 2005). This legislation, coupled with the creation of the first asphalt leisure trails, initially as a means of negotiation of land-easements by a utility company wishing to lay sewerage-pipes (Glanton, 2002) meant that by the early seventies the kernel of the present cart path system was already in place. The, almost accidental, pairing of utility pipes and the paths are of morphological importance, a fact which will be discussed later in the paper. Added to this nascent infrastructure, the fact that Peachtree City also boasted three golf courses meant that the means to turn a system of leisure trails into cart trails, namely the golf carts, were already owned and used by a minority of the population. Today, the extensive system of cart paths has become part of Peachtree City’s unique identity and a major contributor to its success. There are now an estimated 9,000 golf carts used in the city (Kaspriske, 2003) that means that almost every household owns a golf cart and only a small proportion of these carts of these will ever be used on the golf course.

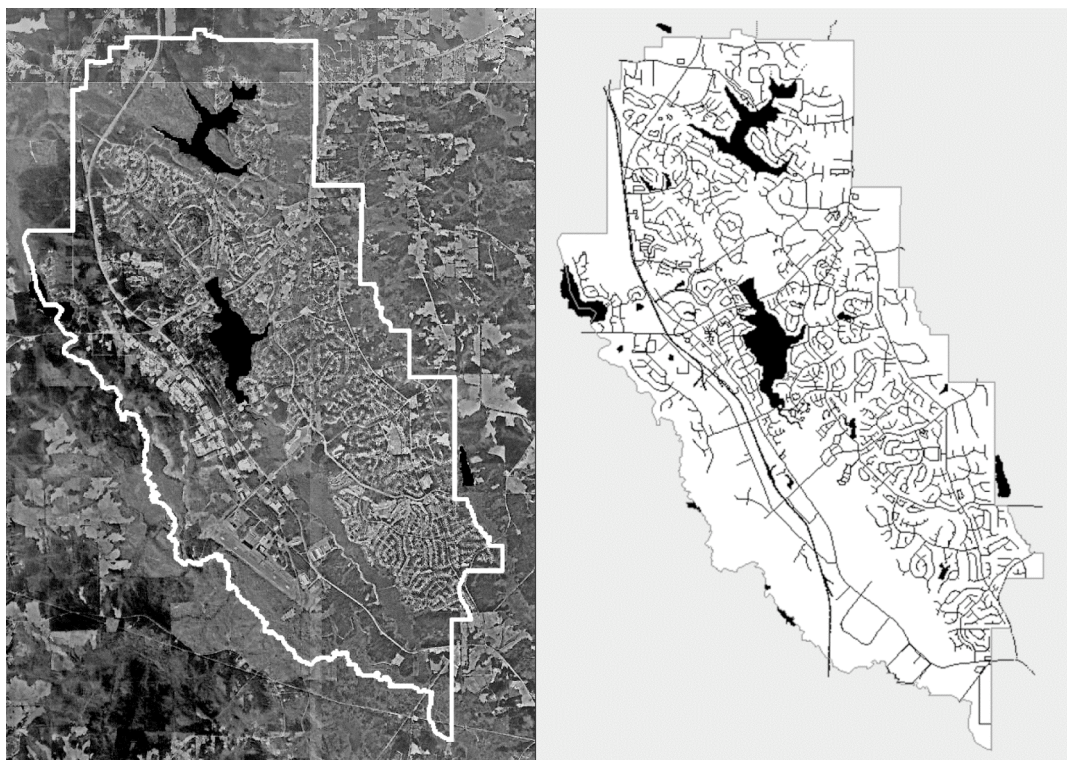


Figure 2. Aerial Photograph and Street Plan of Peachtree City

Methodology

The majority of the fieldwork and observations were made on two visits in May 2003; a third visit was made in July 2003 in order to conduct additional video observations.

On each occasion, we hired golf carts and drove around the cart path system. On the first visit we attempted to traverse as much of the cart system as possible whilst taking photographs and noting the locations of bridges and tunnels⁴ (see Figure 3). On the second visit we selected a continuous cart-path route extending as far south as Braelinn Road and as far north as Flat Creek Road (and passing through both integrated and segregated sections of the system as well as three local shopping centres). To make the observations we attempted to drive at a regular speed along the route noting our time at major intersections with a stopwatch and indicating encounters with other golf carts as a 'dot' on a map. On the third visit we attempted to improve upon the hand-observation method (since juggling a map, a pen and a stopwatch in a shaking cart proved extremely tricky) and decided to use a video camera to make the observations. In this way, we reasoned that we could later distinguish between encounters with pedestrians/cyclists and golf carts (or other classifications of social encounter).



Figure 3. View of a Typical Cart Path Tunnel and Bridge Crossing

The base data for the axial line map⁵ was provided by City Hall and was extracted from their GIS dataset. We encountered some problems creating the axial map. First, the data we had was in the form of road/path centreline data with no information on road widths or building setbacks. Since the definition of axial lines is the longest and fewest lines of sight that pass through a spatial system (Hillier and Hanson, 1984), then we were very aware that our modelling would result in an approximation to *true* axial sight lines. However, during our earlier experiences of driving through the city, we had noted that the density of foliage was so great (more than thirty percent of the city is city-owned parkland, greenbelt or open space) that even had this additional information been available we doubted that the resultant axial map would have been significantly different as many potential lines of sight are impeded by the abundant foliage. Equally, in recent years, research into the use of road centre-line data (Dalton, Peponis and Conroy Dalton, 2003; Turner, 2005) combined with the use of fractional analytic techniques (Dalton, 2001; Dalton, 2005) reassured us that this approach was

⁴ In January 2005 we were provided with a spreadsheet of all locations of path underpasses (tunnels) and bridges by City Hall for purposes of verifying our original data.

⁵ An axial line is an un-occluded line of sight and line of potential uninterrupted movement. An axial map is a 'skeleton' map consisting of the fewest and longest lines of sight that pass through every convex space in a system (Hillier and Hanson, 1984).

valid. However, because of the intricacies of the dual system we were unable to directly use the road centre-line data; instead we redrew it in the manner of a traditional axial map. The final mapping problem concerned situations where both cart paths and roads followed the same route and yet were separate; these needed to be modelled extremely carefully. Additional care also needed to be taken to model the crossings of the path-system and the road system correctly.

In addition to the spatial analyses and observational data collected, the authors were particularly fortunate to be permitted access to the complete dataset of a survey conducted in the summer of 2006, by City Hall, into their citizen's usage of the cart path system. 1,038 surveys were posted to a random sampling of property owners and residents occupying rental accommodation in the city. In addition to this, the survey was made accessible at City Hall, on their website or at the city Library (which could either be filled in onsite, or faxed/posted to City Hall). Nearly 500 households responded and the results of this survey are discussed extensively towards the end of this paper.

A spatial analysis of Peachtree City's cart path system

Fractional analysis (Dalton, 2001) is a computational variant of axial analysis whereby the usual un-weighted graph representation of the axial map network is replaced by a weighed graph in which the edges are assigned values according to the angle between any two intersecting axial lines (the nodes). This method of analysis has been used in all of the Peachtree City analyses since, due to the excessively curvilinear nature of the majority of the roads in the city, fractional analysis produced consistently better results. There are four axial-breakup maps of Peachtree City (Figures 4-6):

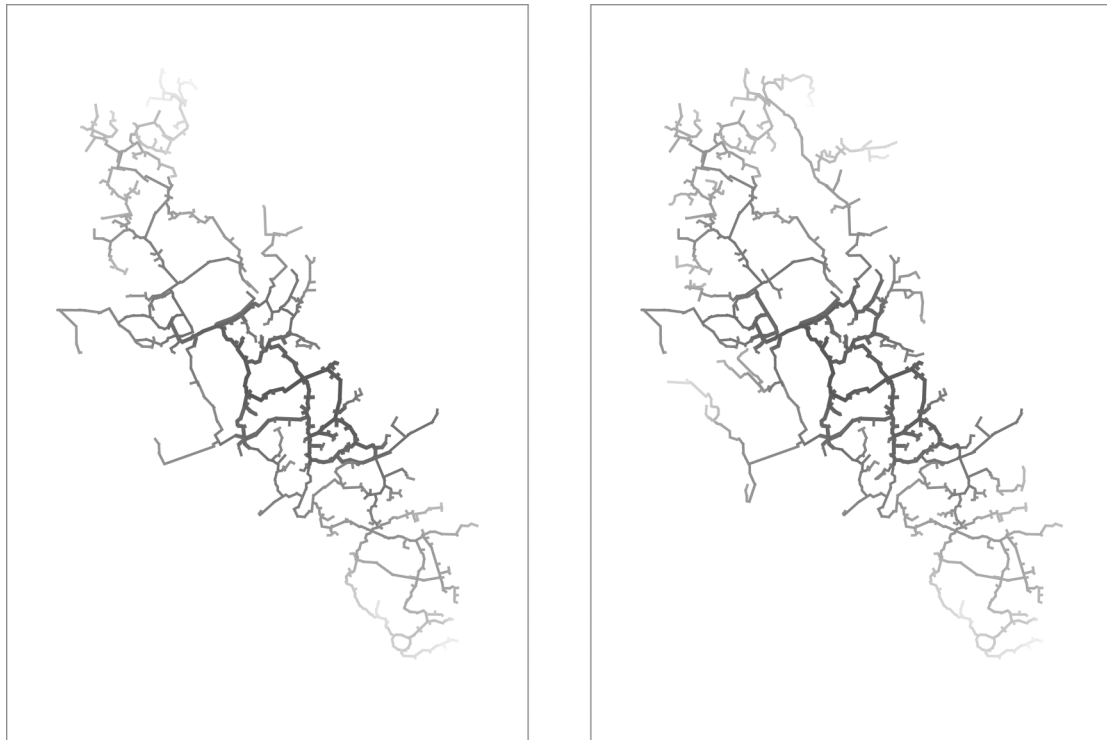


Figure 4. Maps A and B: Fractional Axial Analyses of the Cart Path System (Contiguous System on the Left, Entire System with Road Connections on the Right)

First, consider maps A and B of the cart path network, these have been combined into a single figure, Figure 4. The map on the left shows only the **contiguous** system whereas the map on the right shows the entire cart system with those link-roads necessary to permit the graph, and hence the cart system, to be fully connected. The black lines are the most integrated and the pale grey lines the most segregated. It is evident that there is little or no structure to the cart system when considered in isolation from the rest of the city. The overwhelming result of the fractional analysis is one of a pronounced ‘centrality effect’ which is all the more startling as fractional analysis usually reduces such effects (as compared to other configurational measures: the term configuration as described clearly in the first paper). Were the cart path to exist in isolation it would be extremely unintelligible⁶; the correlation, r^2 , between Radius n (global) integration and Radius 3 (local) integration is 0.03.

⁶ In *Space is the Machine*, Hiller defines the intelligibility of a settlement as being the relationship between local, predominantly visual, cues and the larger-scale spatial structure. Where this correlation is high ($r^2 > 0.5$), an observer’s immediate, visible surroundings provide clues to the overall spatial structure: this is said to be an *intelligible* environment. An unintelligible environment is one where what can be seen bears no relation to a settlement’s overall structure, hence giving rise to confusion and disorientation.

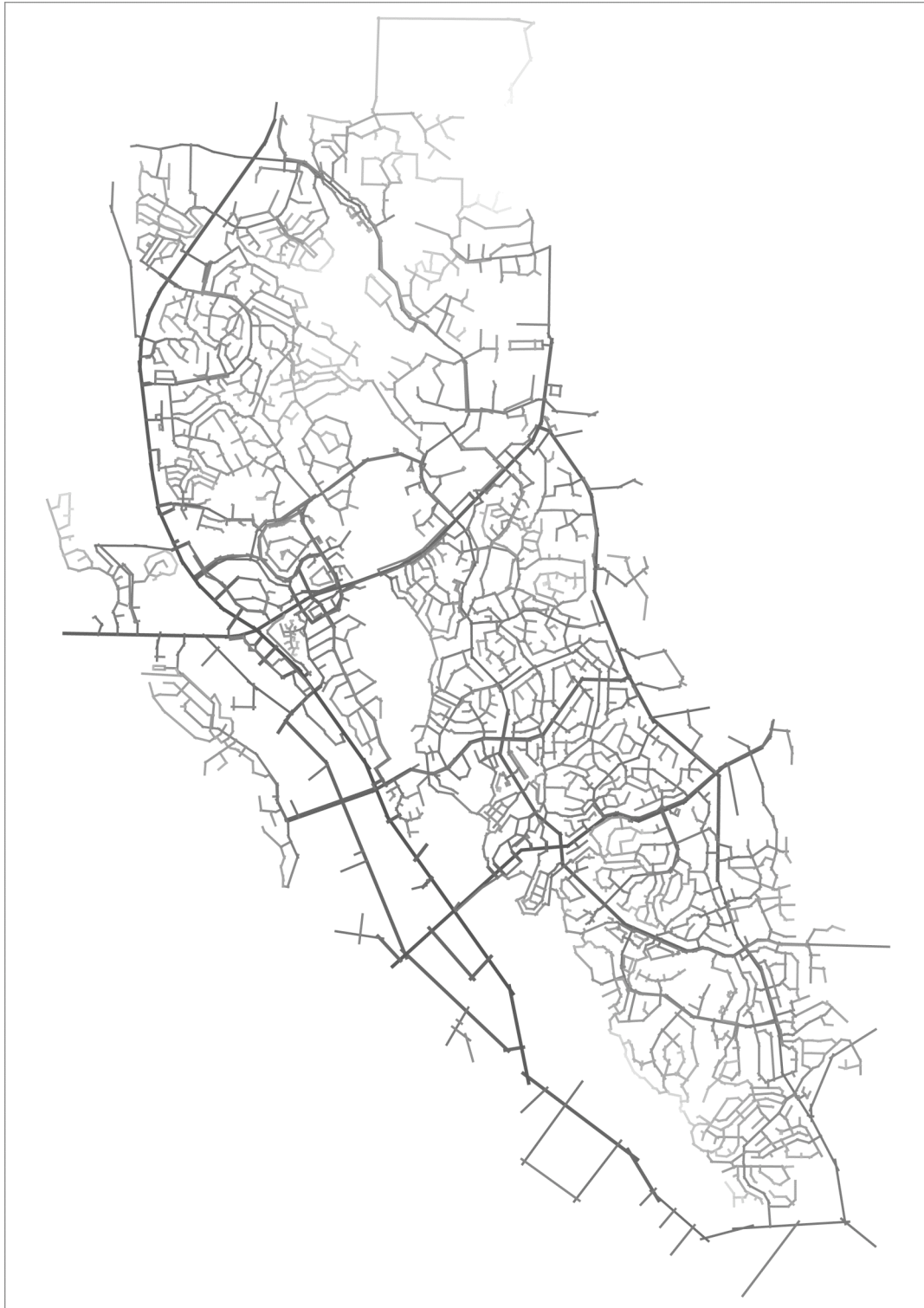


Figure 5. Map C: Fractional Axial Analysis of the Road System

Figure 5 (Map C) shows the fractional integration analysis of the road system, omitting the cart system. There are a number of features of this map that are noteworthy. First, the pattern of highly integrating roads forms a network, which includes a number of the primary roads in Peachtree City. Highways 74 and 54 are clearly highly integrated. Other roads that emerge as high integrators are Dividend Drive, Macintosh Trail, Crosstown Drive, the southern section of Peachtree Parkway

and the northern section of Robinson Road. The presence of the lakes appears as 'holes' in the map as well as, surprisingly, the boundaries between sub-divisions (housing developments).

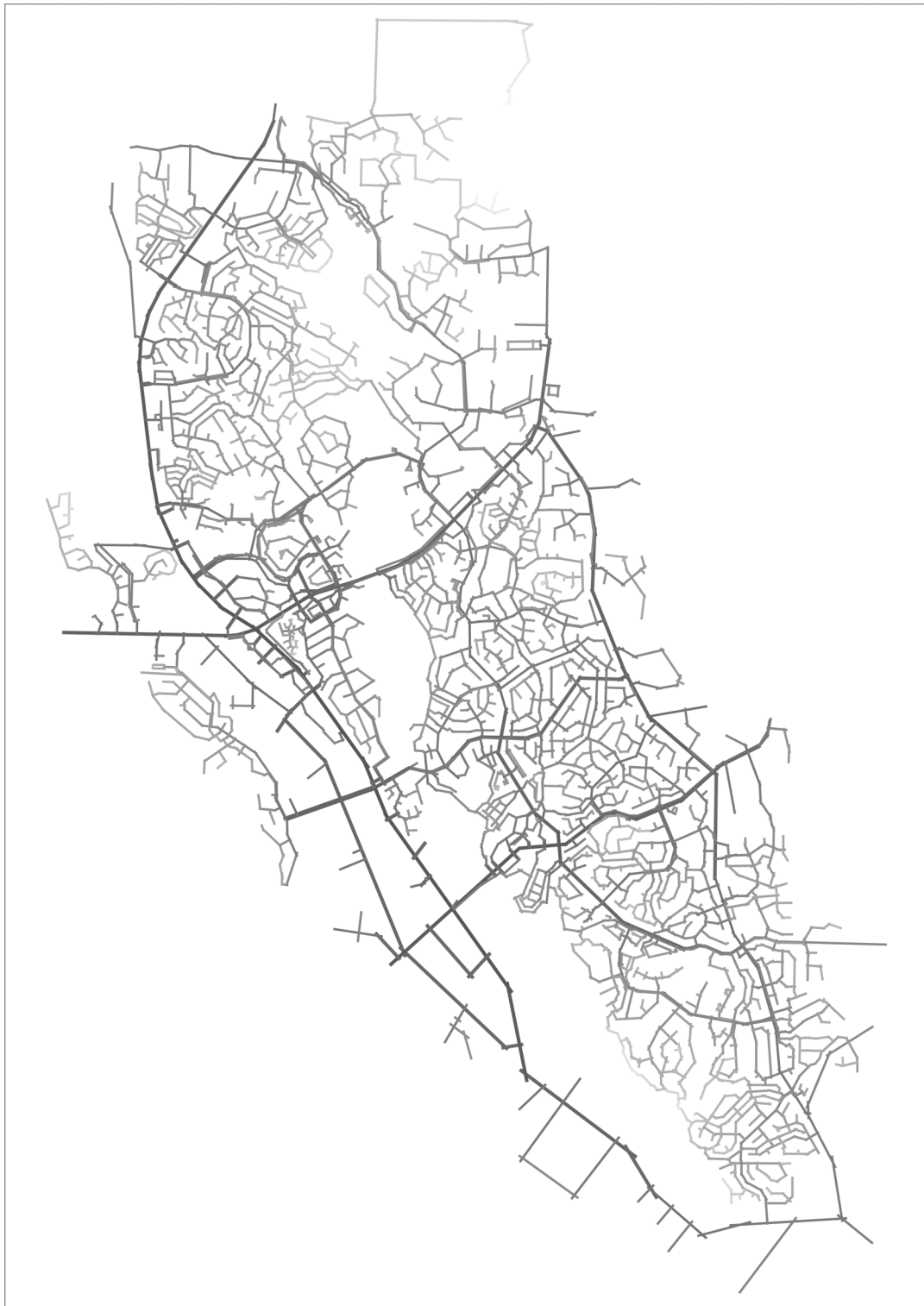


Figure 6. Map D: Fractional Axial Analysis of the Combined Cart Path and Road System

Many of the local housing areas (or ‘villages’) can be identified on the plan due to their clear spatial boundaries. Another feature of this plan is the clear lack of any center as would normally be expected in a town of this size [and as regretted by its founder, Cowan (Frankston, 2002; A.B.C., 2001)]. The closest approximation to an integration core is the intersection of Highways 74 and 54.

Figure 6 (Map D) shows the effect of connecting the carts paths to the road system. Again, the pattern of highly integrated lines includes all of the aforementioned roads which emerged as being integrated in the analysis of the road system, but includes other roads; the majority (rather than mere sections) of Peachtree Way and Robinson Road are now more integrated, pulling the pattern of integration towards the southern boundary of the city. Other roads, which become more integrated through the inclusion of the cart path network, are Flat Creek Road and Kedron Drive. Equally, as in the previous analysis, there is still no proper city center. However, there does appear to be a *nascent integration core*⁷ emerging around the Aberdeen Village Shopping Center (off Highway 54) and this core extends as far as City Hall and the Library (at the North West edge of Lake Peachtree, the other side of Highway 54 and connected via the 1972 pedestrian/cart bridge). Through the inclusion of the cart path network, this small integration core suggests that the city is beginning to function as a coherent small town and that this is due, in part, to the cart system. However, by far the most striking effect wrought by the inclusion of the cart path system is the effect on the local housing areas. Sub-divisions that were separated from their immediate neighbours have become connected. The spatial ‘chasms’ that were evident in Figure 5 are no longer present and the number of ‘dead-ends’ has been dramatically reduced. In Figure 5, 19.17% of axial lines are ‘dead-ends’, i.e. have a connectivity of one; in Figure 6, this number is almost halved, to 10.23%. In absolute numbers, the total number of ‘dead-ends’ is reduced by 94, (a 22% reduction), through the synthesis of the two systems. Clearly, the act of connecting the subdivisions⁸ is helping to provide cohesion to the overall transportation network as well as helping to consolidate its small integration core and global, primary street circulation. However, one factor that does not emerge, which is surprising, is that the cart path network does not make the system any more intelligible (the relationship between local and global syntactic measures). The intelligibility of the system remains virtually unaltered.

The morphological importance of the origins of the cart path system (i.e. laid over waste-water/sewerage pipes) cannot be overstressed. Since the pipes would have been laid efficiently (as pipes are costly), then the pipe-network would have taken the most efficient route possible, minimizing cost. This would have resulted in the original paths following a straighter course than would normally be expected of a network of ‘leisure trails’. The ‘straighter’ the path network, the greater the likelihood of higher mean integration values, as unnecessary spatial depth is not being added to the system. Another advantage of following utility pipes is that they will tend to be most efficient when connecting the greatest number of houses over the least distance. Practically this can be achieved by taking a route between adjacent rear-gardens,

⁷ In the city’s current Comprehensive Plan (CPCPD, 2006a: 10), one of the issues raised is whether there is “a need or desire to create a downtown area or “central business district” within the city? If so, where should this be and to what extent should it be developed?” It could be argued that this ‘nascent integration core’ is an indicator of where such a CBD should be sited, should it be desired.

⁸ Subdivision (or ‘subdivided land’) refers to any parcel of land that is to be used for condominiums, apartments, or any other multifamily dwelling units.

connecting proximate houses and adjacent developments (sub-divisions). This has three results; due to the nearness of the backs of houses, the cart paths are deceptively well constituted⁹ (even despite the excess of foliage) meaning that they are safer than they would otherwise be. Second, the paths are straighter than they would otherwise be were they not following the line of utility pipes; this has the advantage of helping to make the paths less meandering and hence make the overall system more integrated. Lastly, the efficient positioning of the original sewerage pipeline means that the cart paths can often serve the additional purpose of connecting sub-divisions and ‘dead-ends’.

Another measure of how interconnected is a settlement, is the measurement of ‘ringiness’ (Hillier and Hanson, 1984: 104). In graph theory, rings are known as circuits; a circuit is a path that starts and ends at the same node (and has a step depth greater than 1, otherwise it would be a loop). In order to investigate the role of ‘ringiness’ or circuits in axial maps, we developed a method to count the number and length (the number of axial lines forming the path along the circuit) of the circuits. The resultant software program counted only the minimum number of unique circuits in the graph. These data, along with a selection of other measures, including axial ringiness¹⁰, are summarized in Table 1.

	Road System Only	Roads and Cart Paths Combined	% Change
Mean axial line connectivity	2.41	2.70	112 %
Mean axial line integration	0.43	0.48	112 %
Mean length of circuits	9.33	7.83	84 %
Axial ringiness	0.16	0.25	156 %
Number of dead ends	431	337	78 %
Number of circuits	184	410	223 %
Table 1. Values of Measures of the Road and Road/Cart Systems with their Proportional Differences			

As well as the vast reduction of the number of dead ends in the system, after adding the cart paths to the analysis, the most significant change produced by combining the cart paths and the roads is the increase in the absolute number of circuits (or rings) in the dual system. By including the cart paths in the analysis it can be shown that there are more than double (223%) the number of circuits in the resultant axial map.

⁹ The measure of *space constitution* can be found in The Social Logic of Space (Hillier and Hanson, 1984: 105) and is simply the number of building entrances opening onto a convex space (or axial line). This is an example of *permeably constituted* space, however a space can also be said to be *visually constituted* if it is ‘overlooked’ by windows. The implications of spaces being constituted or un-constituted are associated with personal safety and perceptions of safety. Since the presence of a door opening onto or a window overlooking a space implies the potential for the presence of a person (either emerging from the doorway or observing you through the window) then spaces that are constituted are more likely to be safer (or perceived as being safer) than spaces that are not. This is the effect of ‘natural policing’ through co-presence, or in the case of constituted spaces, *virtual co-presence*. During our cart-path journeys in Peachtree City we were constantly surprised at the degree to which, in spaces which initially seemed secluded, glimpses of back-doors and windows were frequent. The paths were far more *visually constituted* than first appearances would suggest.

¹⁰ The definition and equation for *axial ringiness* is given on page 104 in the Social Logic of Space. Axial ‘ringiness’ is defined as being $(2L-5)/I$, where L is the number of axial lines and I is the number of islands or rings (or circuits in graph theoretic terms).

Furthermore, it can be shown that the mean length of the paths forming the circuits falls to 84% (i.e. there are more circuits and they are shorter). If the distributions of the circuit lengths are plotted as two histograms (for roads only and the combined system), a striking pattern of differences between the road system and the integrated cart-and-road system can be discerned. Figure 7 shows the pair of histograms.

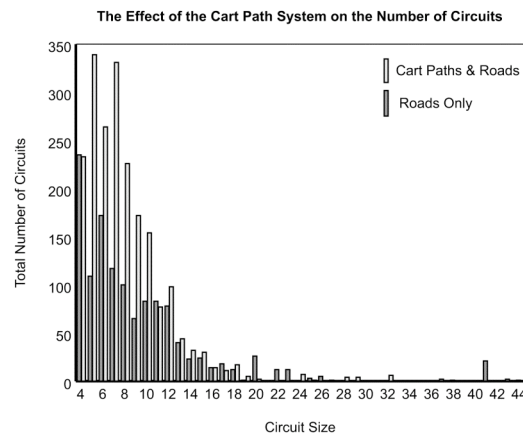


Figure 7. Histograms of the Distribution of Circuit Lengths for Peachtree City for Roads (dark grey) and for Roads and Cart Paths (light grey)

First, it is clear that there is an overall increase in the total number of circuits present in the system (an increase of 223%, as previously stated). However, there is also a change in the distribution of the circuit lengths. There is a greater increase in the number of shorter circuits. Prior to the inclusion of the cart path system, the axial analysis of the roads included a number of extremely long circuits (i.e. of circuit length 44). After the insertion of the cart path system, the maximum circuit depth fell to 16.

Survey Data

As mentioned in the first paper of this issue, space syntax analysis allows us to control for the spatial variable, in this case, in relation to issues of social exclusion and transport. However, in order to fully understand its effect, additional data becomes invaluable and, in this case, this was provided by the results of a survey, as described in the earlier methodology section. There were 489 respondents to the 2006 survey, drawn from a random sampling of 1038 property owners and renters in the city as well as several hundred additional surveys from individuals who accessed the survey at City Hall, on their website or at the Peachtree City library. (This constitutes a high response rate of approximately one third of potential respondents). The survey consisted of four primary sections divided into 36 questions and sub-questions designed to gauge the citizens' attitudes toward, and usages of, the cart path system (CPCPD, 2006b).

Citizens were asked to gauge the relative importance of planning issues facing Peachtree City, on a scale from "very important" to "not important". One of the issues they were asked to judge was the importance of future expansion of the multi-use path system. 75.66% of citizens felt that expansion of the system was either important or very important (see Figure 8). This matches closely with the 80.37% of people who

stated that the path system was one of the things that they most liked about living in the city. 61.55% of respondents claimed that the path system constituted a very important factor in their decision to move to Peachtree City: a further 31.08% felt that it had been a factor, albeit not a major one and only 5.32% stated that it had not been an important factor at all. So clearly, although the system serves as an attraction to people relocating to the city, once they have lived in the city, a greater proportion are convinced of the path system's contribution to their way of life. A comment from one of the surveys says, "We would not live in PTC without the uniqueness of [the] golf cart paths." Later, in the questionnaire, an astonishing 92.02% of households state that at least one of their members uses the path system.

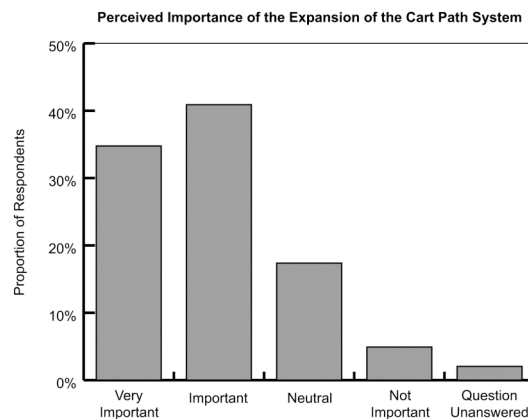


Figure 8. The Perceived Importance of the Expansion of the Path System

When asked about the proportion of journeys made by the cart path system versus the road system, the majority of people (55.01%) estimated that up to 20% of their household's trips were made on the path system as opposed to the road system (the average split being 25.14%/ 74.88%: paths/roads) the proportion of usage on the cart system steadily declined until only 3.48% used the path system for between 80-100% of all their household's journeys. However, were this to be representative of the city as a whole, this indicates that an astonishing 382 households¹¹ use the path system for almost all their trips. See Figure 9. One comment, in the questionnaire, stated, "I found it hard to answer your questions about the golf cart path with accuracy because I use them so often - it feels crazy to be able to explain how often we use them... many times if we can't get there by golf cart we don't go."

¹¹ This is based on a figure of 10,984 occupied households (US Census, 2000), taken from the city's Comprehensive Plan (2007-2027) report, Table 1 (CPCPD, 2006a: 66).

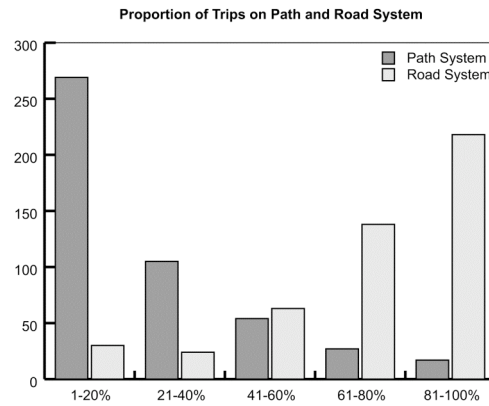


Figure 9. The Proportion of Household Trips made on the Path and Road Systems

In terms of the relative ownership of vehicles, 70.76% of households own at least one golf cart (3.27% own two carts), in contrast to 97.34% of households owning one or more car and 72.39% owning at least one bicycle. These relative figures are shown on Figure 10.

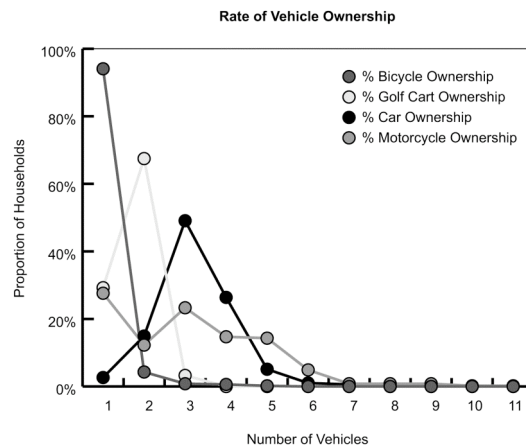


Figure 10. The Proportion of Households and the Numbers and Types of Vehicles Owned.

If the 70.76% of households owning golf carts is considered to be representative of the citywide population, this would amount to an estimated 8131 in private ownership within the city. This matches the estimate of 9000 golf carts (private and public) used in the city (Kaspriske, 2003). The typical Peachtree City household appears to own one golf cart and two cars (Figure 10).

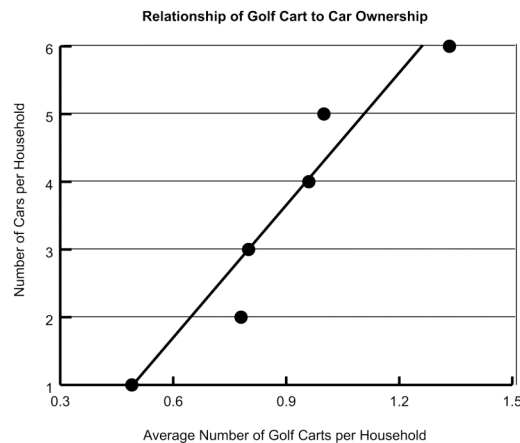


Figure 11. The Relationship of Car to Golf Cart Ownership

However, there is a strong correlation between the number of cars owned and the number of golf carts owned. If the average number of golf carts owned is calculated for all one-car households, two-car households etc. the average number of cars owned by one-car families is 0.49¹² and for two-car families is 0.78. This disproves the hypothesis made by the author, in earlier papers (Conroy Dalton and Dalton, 2005a; 2005b) that families might be purchasing a golf cart as a substitute or alternative to the necessity of owning a second car. Instead, it is plain that the more cars owned, the more golf carts are likely to be owned too. (For all respondents owning two golf carts, their households also owned an average of 3.1 cars.). This does, however, underline the manner in which golf carts appear to be used: namely they are being used to substitute for *trips* and not for *vehicles*. Equally, it is clear that Golf carts are not being bought as status symbols (otherwise why own more than one?); they are being purchased because they are found to be practical.

What types of trips are the ones being substituted? 78.94% go shopping by the path system, 72.60% use it to reach a recreational facility, 28.43% use the path system for the school run, 16.77% go to work and, finally, 58.90% of households use the path system for trips other than those stated above. When asked to estimate the total number of trips made to *all* of the above destinations in a typical week, the aggregate replies amount to a total of 3071 trips being made every week by the 489 households surveyed. This represents 6.3 trips made per week, per household and a total of approximately 68,973 trips being made every week, throughout the city¹³.

When asked what incentives would cause a surveyed household to make more use of the path system for 'destination travel' (as opposed to, for example, exercise), the highest scoring incentive (drawn from a list) was a raise in petrol prices or the problem of growing congestion (Snow, 1999) in Peachtree City (48.47%). The next most influential incentives were, interestingly enough, both spatial. 38.24% of people

¹² These figures are based on an assumption that a *non-response* to the question of how many golf carts a household owns is equal to zero.

¹³ If an average golf cart roundtrip is held to be approximately, at least, two miles in length (the author's own estimation) then, every week, 137,945 miles of trips are made on the Peachtree City path system. Using the EPA figures for fuel consumption, it could be suggested that the city is reducing its CO₂ emissions by 57,315 kilograms (126,358 pounds) per week or 2.9 million kilos per annum through their use of the path system.

said that they would use the path system more if it had more connections between their home and other destinations; 35.58% of people said that their usage of the path system would increase if routes between origins and destinations were more direct. In space syntax analytic terms, these comments equate to higher average connectivity (a greater spread/reach of the system) and the more direct routes would relate directly to a higher average integration value for the whole system. Other factors given were more time to spend travelling (24.74%), improvements in the efficiency of golf cart batteries (21.88%) and a greater choice of trip destinations in the city (10.43%).

One question, asked in the survey was particularly relevant to the issues of social exclusion and travel discussed in this paper: a list of the possible social benefits associated with the path system was provided and respondents were asked to evaluate how significant they held each benefit to be (on a scale of 1 to 5). Included in this list of benefits was the utility of the path system as a means of alternative transportation for older residents, disabled residents, those unable to afford a car, and for children (with adults) and unaccompanied teens. What is most interesting about the replies are the relative ranking afforded to these different social groups, by the respondents.

Social Benefit	“Highly Beneficial” (4 and 5)	“Of Benefit” (3, 4 and 5)	Rank of Benefits Judged to be “Of Benefit” (3, 4 and 5)
Recreation and exercise	88.34%	92.84%	1
Alternative transport	80.78%	91.62%	2
Transport for elderly	80.37%	90.39%	3
Transport for disabled	74.44%	87.53%	5
Reducing air pollution	72.39%	87.73%	4
Transport on low income	64.83%	81.19%	8
Safe trips with children	62.99%	82.00%	7
Way to meet neighbours	59.71%	82.62%	6
Teens learning to drive	45.81%	72.80%	9
Table 2 The Perceived Social Benefits of the Path System: Proportion and Relative Ranking of Importance			

The most popular benefit [considering answers that rated it a ‘4’ or a ‘5’ (of ‘significant benefit’) or at least a ‘3’ (of ‘some benefit’)] was actually that of recreation and exercise, namely one of the only non-transportation-linked social benefits. The next most highly rated benefit was the rather general benefit of being an alternative transportation system (felt to have at least some benefit by 91.62% of respondents). Next, in popularity, 62.99% of people felt that the fact that the path system provided a way for older citizens to travel within the city was highly beneficial (whilst 90.39% felt that it was at least of some benefit.). This fact is reflected by some of the comments provided at the end of the survey: for the most part these reflect the fact that senior citizens are an important sector using the path system and are not reticent about stating their needs, from the more general comment, “Senior citizens comprise a large part of the population and expect better facilities.”, to the very specific, “I think a bridge across Hwy 54 at the Publix Shopping Center would be helpful as there are a lot of people of retirement age in this area.”. Only one voice of dissent is heard, making the comment, “I am disappointed with the very high

profile that is made out of senior citizens.” However, since most of us recognise that we will be old ourselves one day, this is an easy social benefit to be in sympathy with.

As it happens, Peachtree City, like many other US towns, is facing a demographic time bomb, as it has a rapidly aging population. In the city’s Comprehensive Plan (CPCPD, 2006a: 9), it is stated that, “the majority of our current population is between the ages of 40-55. In twenty years time that population is anticipated to be over the age of 65.” And more specifically, “It is anticipated that, between 2005 and 2030, the number of residents over the age of 65 within the city will increase by approximately 93%.” (ibid: 59). 16.36% of the respondents to the survey were of retirement age, this is somewhat higher than for the whole population; in 2005, 3089 citizens were over 65 years of age constituting 8.16% of the population.

The next most highly (fourth of nine) ranked social benefit of the path system was the benefit to disabled residents, although there were no comments made at the end of the survey suggesting that this was an issue that provoked strong feelings one way or another. In many respects, the issues underlying transport and related social exclusion problems are similar for both the old and the less physically able (two groups that frequently overlap). In terms of path usage, those who might be physically unable to drive or equally simply feel unconfident/uncomfortable about driving a car can still maintain a degree of independence. As the former mayor¹⁴ of Peachtree City, Brown, describes, “Daily activity in suburban areas requires an automobile for transportation. By permitting electric vehicles on our multi-use paths our senior citizens and disabled persons can maintain a normal lifestyle without the use of an automobile, bus, or train. They are comfortable with the low speeds and the lack of interaction with automotive traffic. The greatest benefit is that they maintain their social independence and they are able to remain in their homes.” (Brown, 2005).

The social benefit ranked fifth, was that of reducing air pollution [discussed in the author’s previous paper on Peachtree City (Conroy Dalton and Dalton, 2005)] and the sixth ranked benefit was that of providing an alternative and economically affordable means of transport to low-income families. There are considerable economic benefits to owning a golf cart. According to Bullard (Bullard Johnson and Torres, 2000, p.40) the average American household spends one fifth of its income on each car owned. To be able to replace a car (be it for a spouse, teenager or just a local ‘run-about’) by a golf cart represents a considerable cost saving. Not only is the initial cost of buying a golf cart cheaper than that of a car, but because the carts are electric the ongoing running and maintenance costs are lower too. However, if you are unable to afford even one car, then the golf carts become a necessity rather than a luxury. One of the functions of the cart path system in Peachtree City is to provide a private transportation alternative that is financially viable for low-income (and in the USA this is often synonymous with minority) communities. As Brown describes, “New low-income immigrant families from Mexico and South America are able to rent homes and offset the high cost associated with automotive transportation by using inexpensive, low-maintenance electric vehicles on our multi-use path system. There is no stigma attached to using electric vehicles on the multi-use path system as exists with mass transit as nearly every household within the city owns an electric vehicle.” (Brown, 2005).

¹⁴ Brown’s term of office was 2002- 2005 (elected to post November 27, 2001).

However, as seen from the previous section of the survey on car and golf cart ownership, this appears not to be happening. Citizens do not seem to be buying a golf cart as a substitute for a second car, but as an addition to it. Neither is there strong evidence of golf carts being owned instead of cars (a total of just five households in the survey claimed to own a golf cart yet no car; this constitutes just 1.02% of the respondents. These five had an average income which was slightly less than the average household income of Peachtree City, which is \$92,695, but not of a level that could be considered 'low-income'¹⁵.)

Equally, there does seem to be a rather ambivalent attitude towards low-income families in Peachtree City. On the one hand, it is cited by 81.19% of respondents as being an important social benefit of the path system (namely as a means for low-income families to participate fully in the life of the city) and yet, many of the comments at the end of the survey reveal a clear desire that Peachtree City remain an city whose residents are higher than average income earners. Comments such as, "Low income housing... should be limited." "Stop building apartments." And "Discontinue all subsidized apartments in PTC." Were made. One counter-plea was put forward at the end of a survey, "Some people love it here but are too poor to stay, even people who don't make much money are good people and deserve to have a place to live they can afford. PTC is sad because the cost of living is very high..." In summary, it does appear that although only a small minority of households could be considered to be low-income, the path system does ensure that they need not be socially excluded for transportation reasons.

Interestingly, the one group who are often socially excluded through transport and are clearly benefiting greatly from the path system in Peachtree City are the young adults or 'teens'. In Peachtree City a young adult may drive a golf cart from the age of fifteen or from twelve if accompanied by a parent or guardian (CPCPD, 2006c). This not only permits them a degree of independence at a younger age, but means that pressure is taken off the road system during the 'school run'; older children can drive themselves (and younger siblings) to school, as well as to extra-curricular activities (e.g. soccer practice). However, in terms of the social benefit it provides, this benefit was ranked lowest of all nine polled with only 45.81% respondents saying that it was highly beneficial (72.80% conceded that it was of some benefit). The reason for this somewhat lukewarm response was clarified by the many comments at the end of the survey, typical examples being: "Too many reckless teens on cart paths." and "Too many kids are driving golf carts with disregard to rules and people on the paths." But not all respondents view this phenomenon in such a negative light, some positive comments being: "I love the ability of teens being able to utilize golf carts." and "I think it is rather important that teens continue to be allowed use of the path system with or without a driver's license so that parents who would rather ease into their children's ability to drive [have this option] available." Despite the apparent problems of rather reckless driving behaviour by young adults, they are clearly taking full advantage of the path system in order to travel to school, work and to socialise. It would be practically impossible to imagine that a young adult of Peachtree City might

¹⁵ According to the *Federal Register*, Vol. 71, No. 15, January 24, 2006: 3848-3849, the 2006 HHS Poverty Guidelines state that for a household with four members, the poverty income threshold is at \$19,999 or below. 2.04% of the survey's respondents could be said to be in poverty. This compares to 6.8% of Peachtree City households, according to the Comprehensive Plan (CPCPD, 2006a).

suffer from transport related social exclusion problems, in the manner in which young people frequently do elsewhere. This is, perhaps, a case of one issue (social exclusion) being supplanted by another (antisocial behaviour).

Discussion and Conclusions

There are two trends that are evident from the preceding sections of this paper. The first trend is, unarguably, that the path system in Peachtree City is being heavily used and is extremely popular with the city's residents. This popularity is substantiated by the findings of the survey detailing household's everyday patterns of usage of the system. It is also evident that certain sectors of society are benefiting more from the existence of the network and, in particular, minority groups that might otherwise struggle to make essential trips. These being: the elderly, those with physical mobility problems, the young and the economically disadvantaged (although, on evidence, this group appears to be small in Peachtree City). Furthermore, these social benefits are recognised and lauded by an astonishingly large proportion of the population. The only possible exception to this universal approbation could be the high usage of the path system by young adults, a phenomenon that suggests that the uptake of trips by this group has essentially become a 'victim of its own success'.

The second trend arises from the spatial nature of the path system. Because the cart path system serves to significantly reduce dead-ends and connect adjacent local areas (evidenced in the increased ringiness of the combined network) then it is inherently functional as an alternative transportation system. Add to this, the fact that the cart path system connects residential areas to useful 'destinations'¹⁶ such as schools, shopping centers, cinemas and libraries then the network that has been created, and is still being expanded, is a parallel structure that can begin to take the pressure off the road/car system.

With respect to issues of social inclusion the benefits outlined above are clearly a result of the existence of the path system. It must, however, be noted that these benefits are not automatic; if the cart system did not function well, it would not have the high proportion of usage that it does and the associated benefits would be less easily discernable or simply absent altogether. It is not enough to have a cart path system – you have to have the right system and Peachtree City seems to have got it right.

What are the implications of this for other communities and in particular for the UK? In terms of social exclusion and transport it is clear that having an affordable, alternative transportation system, can be of benefit to those members of society most at risk of exclusion through transport related issues. However, it is highly unlikely that the success of Peachtree City could simply be transplanted in the UK. However, there is a growing trend, in the UK, towards 'greenways' and leisure trails. A distinction should be made, at this point, between 'commuter routes' or routes connecting key destinations such as places of work, shops and schools etc. and 'leisure routes' where the emphasis is on exercise in a natural environment. Of course, the two types of pathway need not be mutually exclusive, as is clearly demonstrated by the Peachtree City path system. However, with respect to combating social

¹⁶ City Hall's own definition of the network is one that interconnects, "*neighborhoods, retail centers, churches, schools and recreation areas.*" (Peachtree City Department of Planning, 2006).

exclusion through access to transport, it is the first kind of path, the 'commuter routes' that are required.

In the UK, most 'commuter routes' are aimed at the cyclist and many towns already have, or have proposals for, segregated cycle paths for commuter traffic. Clearly, in terms of the above mentioned socially disadvantaged groups, cycling is an option that could appeal to the young and the economically disadvantaged but will rarely be a viable option for older or physically disabled people.

Another trend, that is receiving a lot of press in the UK at the moment, is the high rise of 'mobility scooters' that are precisely targeted at the elderly and those with mobility problems. One of the current debates is about the safety of these vehicles, particularly when occupying the same crowded pavements as pedestrians; there has been a sharp increase in the numbers of accidents involving mobility scooters. However, in one respect they are the closest UK solution to Peachtree City's golf carts. But, they do suffer from a problem that the golf carts do not have and that is stigma. What is particularly successful about the golf carts of Peachtree City, is that they are effectively a 'one size fits all solution' and as Brown says, there is no stigma attached to driving around in a golf cart, since everyone does it. Many young and disabled people in the UK are put off buying a mobility scooter due to its associations with the elderly (Adams-Spink, 2005). The other disadvantage to mobility scooters (and, to some extent, bicycles) is that they are single occupancy vehicles. If a disabled mother wants to take her child to school, she would not be able to use a mobility scooter (RoSPA, 2005). It is clear that part of the success of the golf carts in Peachtree City is also attributable to the fact that they are able to take passengers, in other words they are particularly flexible as an alternative transportation option.

Finally, even were a combination of bicycles, electric-assisted bicycles and mobility scooters available and were allowed on a path system, would this be as successful as the path system in Peachtree City? In Milton Keynes¹⁷, there is a dedicated, alternative path network, known as The Redway (it is covered in red asphalt). They are intended for use by pedestrians, cyclists and wheelchair users. Although a grey area in British law, most mobility scooters are classified as wheelchairs (RoSPA, 2005) and are therefore permitted on The Redway. In theory, here is a system of segregated paths, permitting a wide range of alternative vehicles and yet its usage is comparatively low (Franklin, 1999). The reason for this is that the Redways of Milton Keynes are too meandering, lack a coherent spatial structure, have a low connectivity, short lines of sight and are almost completely unconstituted (in space syntax terms). This network is simply poorly designed (ibid).

The conclusion is that in order to reproduce the success of the path system of Peachtree City in the UK, two primary needs would have to be satisfied. The requirement of a spatially coherent and integrated path network and a suitable vehicle, permitted to use the path, that is sufficiently flexible to fulfil the needs of disparate users, meaning that it is truly egalitarian (and so has no stigma attached to it). Were this duality of needs met, it is clear that this would be a solution that would help to combat transport related social exclusion, as is clearly demonstrated by the case study

¹⁷ Milton Keynes is the last and largest of the English 'new towns', begun in 1970, in the county of Buckinghamshire to the North West of London. Its population was 184,506 at the 2001 census.

of Peachtree City. If such a transportation solution to social exclusion could be found it would constitute a private rather than a public transport solution and hence this would be quite a different approach to the vast majority of current transport initiatives being researched or implemented in this area.

Any future research into this area should address the following questions: what would be needed to transform a spatially dysfunctional network, such as Milton Keynes' Redways, into a fully functioning, useable, parallel system? If no existing network is in place, how could such a network be integrated into an existing road system? What changes in legislation and/or technology could promote a new 'type' of flexible vehicle capable (in the mode of Peachtree City's golf carts) of utilising such a system?

Acknowledgements

To the City Planner of Peachtree City, David Rast, for permitting me full and unlimited access to their raw survey data, even before it had been analyzed by City Hall (and hence demonstrating a wonderful degree of trust in both me and their city). To City Hall, Peachtree City for the GIS data and additional information on the location of cart path tunnels and bridges. Finally, to Stephen D. Brown, the former mayor of Peachtree City for his generosity of time, accessibility and willingness to talk about the town.

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